

Amendments to the Specification:

Please replace paragraphs 2-36 of the Summary of the Invention, with the following amended and new paragraphs:

According to one aspect of the present invention, it is provided a system for accessing and transmitting different data frames in a digital transmission network, the system comprises:

at least one user-network interface (UNI), coupled with a subscriber's network; and at least a network-network interface (NNI), coupled with the digital transmission network to transfer data; and

a data converting device, coupled with the UNIs and the NNIs, configured to convert data formats between the UNIs or data formats between the NNIs or data formats between the UNIs and the NNIs;

the data converting device comprises a virtual bridge device and a virtual interface device, the virtual interface device coupled to the UNIs and the NNIs, the virtual bridge device comprises:

an inter-device interface, configured to input and output the data frames;

a virtual bridge processing unit, coupled with the inter-device interface for processing of the data frames;

a database, coupled with the virtual bridge processing unit and configured to store information indicative of data types to facilitate the processing of the data frames of the virtual bridge processing unit according to the data types; and

a control interface unit, coupled with the database, the database being controlled via the control interface unit, wherein

the virtual bridge device is configured to

determine whether the data frames entering the virtual bridge device are control messages,
transmit the control messages to an external control system via the control interface unit if
the data frames entering the virtual bridge device are control messages,

extract an input data type number, a destination address and a virtual Local Area Network
(VLAN) number from the data frames if the data frames entering the virtual bridge device are
not control messages,

search in the database according to the input data type number and determine whether the
retrieval result from the searching is blank, discard the data frames and end the process if the
retrieval result is blank and extract a virtual bridge number and a port number from the retrieval
result if the retrieval result is not blank,

determine the processing flow according to the destination address, perform a multicasting
sub-flow, and then end the process if the destination address is a multicasting address; perform a
broadcasting sub-flow, and then end the process if the destination address is a broadcasting
address,

search in the database according to the virtual bridge number, the port number, the
destination address and the VLAN number if the destination address is neither a multicasting
address nor a broadcasting address, perform the broadcasting sub-flow or discard the data frames
and end the process if the retrieval result is blank, and extract an output port number from the
retrieval result, modify the data frame so as to replace the input data type number in the data
frames with the output data type number, send the modified data frames via the inter-device
interface, and then end the process if the retrieval result is not blank, a system accessing and
transmitting different data frames in a digital transmission network, for accessing and
transmitting different data frames, said system comprises:

At least a UNI, which is used to couple with the subscriber's network; and/or at least a NNI, which is used to couple with said digital transmission network to transfer data; and

A data converting device, coupled with said UNIs and said NNIs, which is used to convert data formats between said UNIs or data formats between said NNIs or data formats between said UNIs and said NNIs;

Wherein said data converting device comprises a virtual bridge device and virtual interface device, the virtual interface device coupled to the UNI and the NNI, the virtual bridge device comprises: an inter-device interface, which is used to input and output data frames; a virtual bridge processing unit, which couples with the inter-device interface to process data; a database, which stores information corresponding to types of data and couples with the virtual bridge processing unit so as to process data according to the information; and a control interface unit, which couples with the database and the virtual bridge processing unit so as to control them;

the virtual bridge device switches data between the UNIs and the NNIs, and the virtual bridge device determines whether data frames entering the virtual bridge device are control messages, and transmits the control messages to an external control system to process via the control interface unit if the data frames entering the virtual bridge device are control messages and switches data frames if the data frames entering the virtual bridge device are control messages.

Optionally, said inter-device interface connects with a data processing and dispatching service.

Preferably, said database comprises a virtual bridge database, a multicasting database and a forwarding database; [[said]] the multicasting database and [[said]] the forwarding database store the virtual bridge number, virtual bridge an input port number, the destination address [[input]],

an VLAN number input number, a VMAN number [[input]], ~~virtual-bridge~~ the output port number; [[said]] the virtual bridge database stores input data type number [[input]], the virtual bridge number, the port number, the output data type number output.

Optionally, said control interface unit provides an external control interface and adds, deletes, modifies and searches in said database via said control interface, and monitors said virtual bridge processing unit.

Preferably, said virtual bridge processing unit processes data frames according to embedded logic and controls formats of forwarding items in the forwarding database, formats of multicasting items in the multicasting database, and formats of items in the virtual bridge database.

The present invention also provides a method of accessing and transmitting different data frames in a digital transmission network through a system including a virtual bridge device, wherein the virtual bridge device comprises:

an inter-device interface configured to input and output the data frames;

a virtual bridge processing unit, coupled with the inter-device interface for processing of the data frames;

a database, coupled with the virtual bridges processing unit and configured to stores information indicative of data types to facilitate the processing of the data frames of the virtual bridge processing unit according to the data types; and

a control interface unit coupled with the database, the database being controlled via the control interface unit,

wherein the method comprises the following steps:

determining whether the data frames entering the virtual bridge device via the inter-device interface are control messages;

if they are control messages, transmitting the data frames to an external control system via the control interface unit and ending the process;

if they are not control messages, extracting an input data type number, a destination address and a virtual Local Area Network (VLAN) number from the data frames;

searching in the database according to the input data type number and determining whether the retrieval result from the searching is blank;

if the retrieval result is blank, discarding the data frames and ending the process;

if the retrieval result is not blank, extracting a virtual bridge number and a port number from the retrieval result;

determining the processing flow according to the destination address;

if the destination address is a multicasting address, performing a multicasting sub-flow, and then ending the process;

if the destination address is a broadcasting address, performing a broadcasting sub-flow, and then ending the process;

otherwise, searching in the database according to the virtual bridge number, the port number, the destination address and the VLAN number ;

if the retrieval result is blank, performing the broadcasting sub-flow or discarding the data frames and ending the process;

if the retrieval result is not blank, extracting an output port number from the retrieval result, modifying the data frame so as to replace the input data type number in the data frames with the output data type number, sending the modified data frames via the inter-device interface, and

then ending the process, a method of accessing and transmitting different data frames in a digital transmission network through said system, said system comprises a virtual bridge device, wherein said method comprises the following steps:

Determining whether the data frames entering said virtual bridge device via the inter device interface are control messages;

If they are control messages, transmitting the data frames to the external control system via the control interface unit and ending the process;

If they are not control messages, extracting input data type number and destination address information from the data frames;

Searching in the database according to the type number and determining whether the retrieval result is blank;

If the retrieval result is blank, discarding the data frames and ending the process;

If the retrieval result is not blank, extracting relevant information from the retrieval result;

Determining the processing flow according to said destination address information;

If the destination address is a multicasting address, performing the multicasting sub-flow, and then ending the process;

If the destination address is a broadcasting address, performing the broadcasting sub-flow, and then ending the process;

Otherwise going to the next step;

Searching in the database according to the second rule constituted by the obtained input data information;

If the retrieval result is blank, performing the broadcasting sub-flow or discarding said data frames and ending the process;

If the retrieval result is not blank, modifying the data frames, and sending said data frames via the inter-device interface, and then ending the process.

Optionally, said step of extracting input data type number [[and]] , the destination address information and the VLAN number from the data frames also comprises a step of extracting source address of input data and VLAN number.

Preferably, the step of searching in the database according to the type information and determining whether the retrieval result is blank further comprises:

Searching in the virtual bridge database with the index of extracted data type number information;

The step of extracting relevant information from the retrieval result comprises: extracting the virtual bridge number and port number from the retrieval result; learning the source address and updating the forwarding database according to the learning result.

Optionally, the step of searching in the database according to the virtual bridge number, the port number, the destination address and the VLAN number comprises: searching in a forwarding database according to the virtual bridge number, the port number, the destination address, the VLAN number searching in the database according to the second rule constituted by the obtained input data information comprises: searching in the forwarding database with the index of the virtual bridge number, port number, destination address, VLAN number as indexes; said second rule is whether the virtual bridge number, port number, destination address, VLAN number are found.

Preferably, the step of modifying the data frames so as to replace the type number in the data frames with the output data type number comprises:

searching in the virtual bridge database according to the virtual bridge number and the output port number;

determining the retrieval result,

if the retrieval result is blank, discarding the data frames and ending the process;

if the retrieval result is not blank, extracting output type number information from the retrieval result and modifying the data frames so as to replace the type number in the data frames with the output data type number, modifying data frames and outputting said data frames via the inter-device interface comprises:

Extracting output port number information from the retrieval result;

Searching in the virtual bridge database with the index of virtual bridge number and output port number;

Determining the retrieval result,

If the retrieval result is blank, discarding the data frames and ending the process;

If the retrieval result is not blank, extracting output type number information from the retrieval result and modifying the data frames, i.e., replacing the type number in the data frames with the output data type number;

Outputting the modified data frames via the inter-device interface.

Optionally, said broadcasting sub-flow comprises:

Searching in the virtual bridge database for the first item corresponding to the virtual bridge with the index of the virtual bridge number;

determining the retrieval result, If the retrieval result is blank, discarding said data frames and ending the sub-flow;

If the retrieval result is not blank, comparing the input type number in the retrieval result with the type number in the data frames;

If they are equal, search in the virtual bridge database for the next item corresponding to said virtual bridge with the index of the virtual bridge number, and then returning to determining the retrieval result;

If they are not equal, copying the data frames, extracting output data type number from the retrieval result and modifying the copied data frames (i.e., replacing the type number in the copied data frames with the output data type number), and then outputting the modified copied data frames via the inter-device interface.

Preferably, said multicasting sub-flow comprises:

With the index of the virtual bridge number, input port, destination address, and VLAN number, searching in the multicasting database for the first item corresponding to these key words;

Determining the retrieval result,

If the retrieval result is blank, discarding said data frames and ending the sub-flow;

If the retrieval result is not blank, comparing the output port number in the retrieval result with the extracted input port number (i.e., in the virtual bridge database, the input port number corresponding to the data frame type number);

If they are equal, searching in the multicasting database for the next item with the index of the virtual bridge number, input port, destination address, and VLAN number, then returning to determine the retrieval result;

If they are not equal, searching in the virtual bridge database with the index of the virtual bridge number and output port number;

If the retrieval result is blank, discarding said data frames, and searching in the multicasting database for the next item with the index of the virtual bridge number, input port, destination address, and VLAN number, and returning to determining the retrieval result;

If the retrieval result is not blank, copying said data frames, extracting output type number from the retrieval result, modifying the copied data frames (i.e., replacing the type number in the copied data frames with the output data type number), and then outputting the modified copied data frames via the inter-device interface.

The system and method according to the present invention have the following advantages:

A virtual bridge device can provide a plurality of virtual bridges. Each virtual bridge possesses all functions and properties of a bridge device. However, different from the bridge device, the virtual bridge can be established and deleted dynamically. During operation of the system, the operator can establish or delete a plurality of virtual bridges dynamically because each virtual bridge has an independent address space, the operator can provide VLAN service to subscribers with different virtual bridges if conflicts exists among address spaces. The operator can configure a virtual bridge just like a physical bridge. The virtual bridge further expands the functions of physical bridge to support VMAN-based switching operation. With the system and method according to the present invention, integral VLAN services can be provided for subscribers, and any restriction on Ethernet data frame address space at user network interfaces is eliminated. When a plurality of Ethernet data frames is sent to such a network device, there is no restriction on address space of Ethernet data frames.